Twitter Thread by Glen Peters

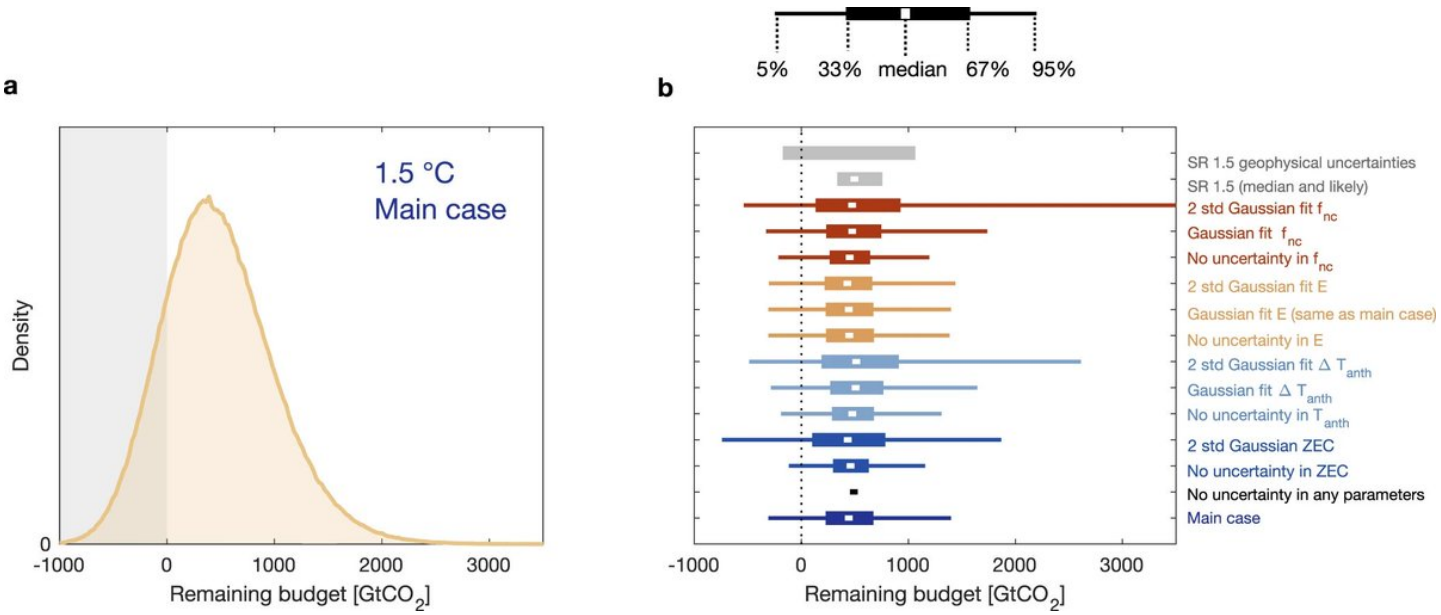
Glen Peters
@Peters_Glen

To say "the remaining carbon budget for 1.5°C is 440 GtCO■" [add favorite number] is highly misleading

Taking a narrow 67–33% range, the value is 230–670 GtCO■, but full range (left) could be –1000 - 2000 GtCO■... (yes, could be negative or huge)

1/

https://t.co/T9GvpoH0l8



When I wrote "studies ranging from –100 to about 800 GtCO■" back in 2018 I was being very conservative (there were no full uncertainty analyses then) https://t.co/KhyA1rYpDJ

Good to see papers (now) being much more explicit about the uncertainty & range...

2/

I have problems with the remaining carbon budgets presented as a single number, instead of a range. Is there any other climate variable presented as a one-sided probability? The ECS, eg, is presented as a range.
https://t.co/KhyA1rYpDJ

Good to see the authors use ranges!

3/

Expressions of uncertainties

The way uncertainties are expressed also needs to be reconsidered. Early on, a choice was made to express carbon budgets probabilistically. For example, studies provide a carbon budget for a 66% chance to stay below 2 °C. This is problematic. First, different approaches to carbon budgets (based on Earth system models versus integrated assessment models), use different probabilistic definitions. This makes their carbon budgets incomparable and leads to confusion[10]. Second, probabilistic expressions require independent and sufficient input data to derive reliable distributions, whereas many of the samples are too small for reliable statistics, whether across Earth system model ensembles or across scenarios. Third, not many have sufficient understanding of statistics or realize that the probabilistic carbon budget is a way to summarize a statistical distribution.

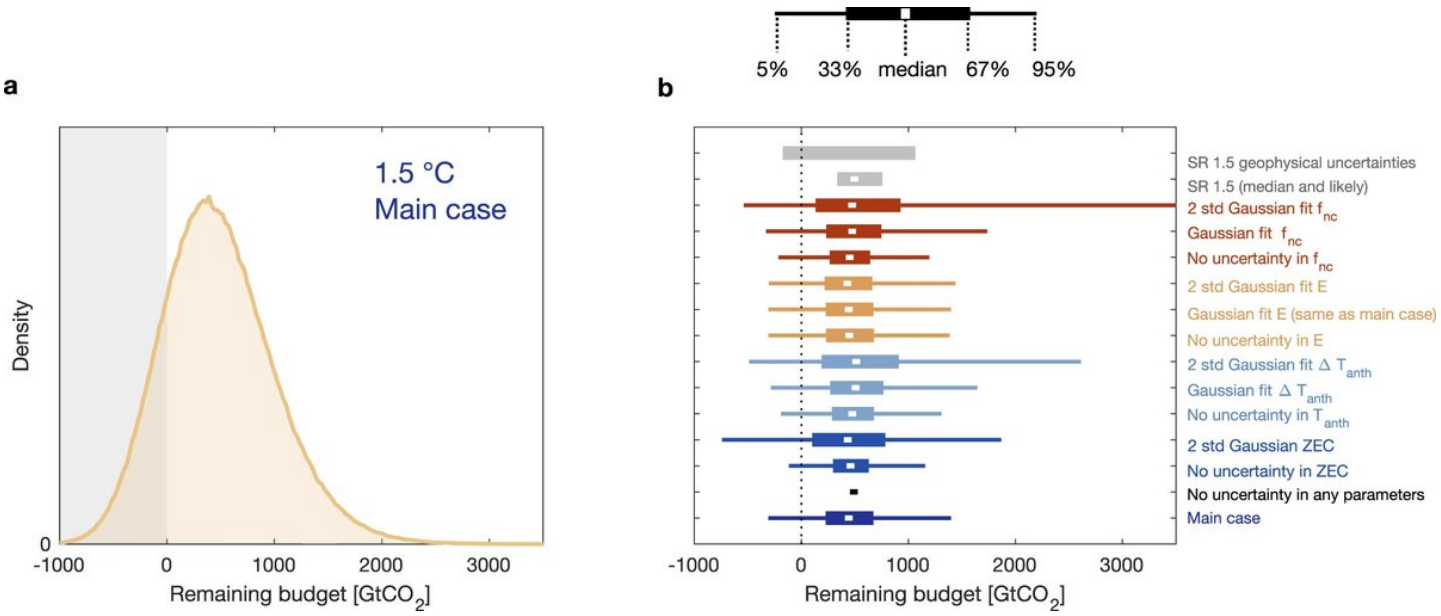
The equilibrium climate sensitivity is generally expressed by its uncertainty range or distribution, and not as the probability that the cumulative distribution lies to one side of a given value (as done for carbon budgets). Analogously, the median remaining carbon budget in one study was expressed[3] as 760

The uncertainties on remaining carbon budgets are huge. Let that sink in.

There is a decent chance the remaining carbon budget for 1.5°C is negative... (ie, too late)

[The uncertainties here are 33-66%, IPCC would usually take "likely" which is more like 16-84%]

4/



Many of these issues were discussed by me https://t.co/KhyA1rYpDJ & @Oliver_Geden https://t.co/Kj7heJTALN

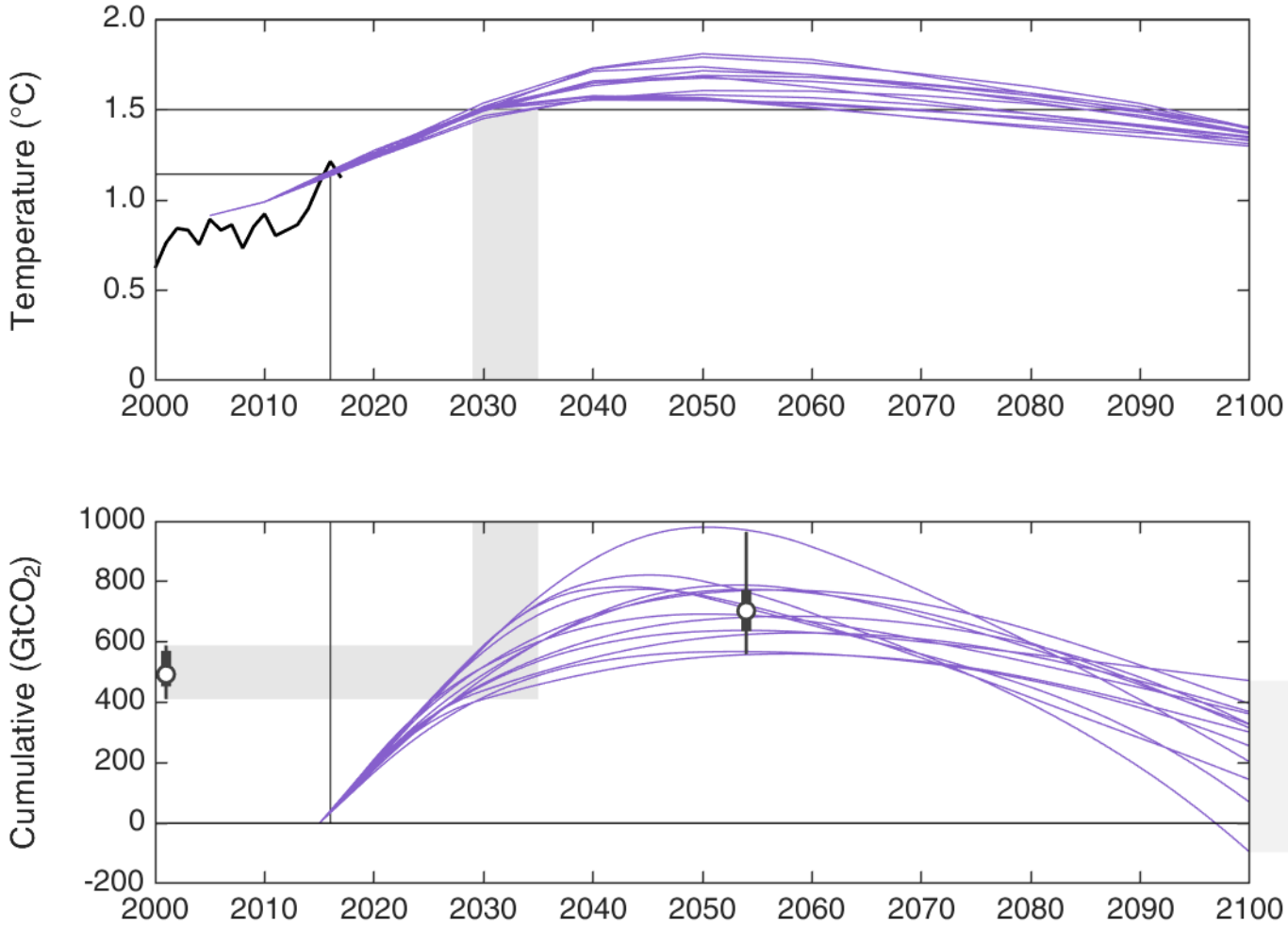
Back in 2016 I raised many of the same issues: https://t.co/bjOnjQWOqc

[I guess I should publish articles & not commentaries, as perhaps people would read them...]

5/

Here is a blog where I discuss many of these issues, including the uncertainties & the existence of negative remaining carbon budgets for 1.5°C [coincidentally from the model that gave the small budget for 1.5°C in AR5, oh, wonder why...] https://t.co/6H4k5GTHf6

6/6


Temperature (°C)
2.0
1.5
1.0
0.5
0
2000
2010
2020
2030
2040
2050
2060
2070
2080
2090
2100

Cumulative (GtCO2)
1000
800
600
400
200
0
-200
2000
2010
2020
2030
2040
2050
2060
2070
2080
2090
2100